4-24-2018

Archeological Survey at Wilson Cemetery: The Search for A Missing Grave

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Figure 1 - Wilson Cemetery along transect four

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CCAMP Spring 2018

This study employed the use of various field survey techniques to investigate the possibility of missing graves at the Wilson Cemetery. Through examining historical records, it is believed that the missing grave may be Agnes Wilson, sister of Alfred and Frank Wilson whose graves are the two marked within the cemetery. Through the use of metal detectors, soil probing, thermal imaging and a cadaver dog a few areas have been located that may be the missing grave, however, none of these methods agree on its location.

Introduction

The surveys described in this report was completed during the Cape Canaveral Archeological Mitigation project's (CCAMP) second season. The Wilson Cemetery is located on the Cape Canaveral Air Force Base's Burns site (8BR85) and is one of two cemeteries within its boundaries. The site is a short distance east of the Banana River. It is multicomponent, as it also contains a Malabar Period Burial Mound and its surrounding midden. The midden was excavated during the 2018 field season alongside the work done in the Wilson Cemetery.

The Wilson Cemetery consists of two graves and a memorial. The graves face east and are covered in gravel. They have a wooden barrier 296 centimeters long and 260 centimeters wide (Fig. 6). It is possible that these do not mark the true locations of the graves and were simply an estimation. The memorial is in the south-west corner of the fenced in area, it is also surrounded by gravel (Fig. 2).

Figure 3 shows the entire site rendered with GPS points and put together in ArcGIS. The map was put together by Kylee Crook, a member of the 2018 Wilson Cemetery team.

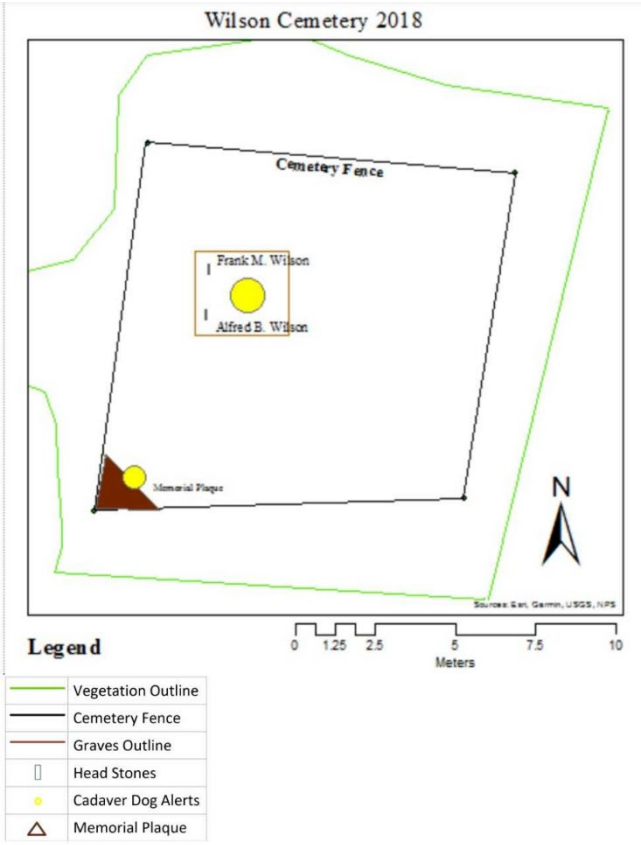

Figure 2 - ArcGIS Map of Wilson (Baez et al. 2018)

Figure 3 - Wilson Graves Memorial

All surveys done at Wilson were laid out on transects two meters apart. There are nine transects total, with the first and the last extending into the vegetation. The transects run East to West. This was chosen so that the transects would parallel with the grave markers (Fig.1). The West edge of the cemetery is, at 15 Meters, about two meters short of the East side, at 17.2 Meters. Thus, the eighth and ninth transects run shorter than the rest. Both cemeteries, Burnham and Wilson, were surveyed through the use of soil probing, a cadaver dog, thermal imaging, and metal detecting. The soil probe was inserted every meter along the transects, any change in soil resistance was noted. The metal detector survey was done using a Garrett Treasure Ace 300 with a 12-inch coil and also followed along the transects. When using the thermal imaging camera, we walked along the transects, but images were taken as they appeared. The cadaver dog, a black lab named Jessie, wandered about as he pleased and even went into the vegetation to sniff out possible graves. He alerted by barking and his alerts were noted in reference to a transect.

Background

The history of Wilson Cemetery told here was gathered by Gabriela Baez, a member of the CCAMP team assigned to Wilson Cemetery, and is further elaborated on in her report. The Burns site itself is on the 160 acers of land owned by Mills Burnham, the first Anglo-settler and permanent lighthouse keeper at Cape Canaveral. His oldest daughter, Frances, married Captain Henry Wilson from Penn Yang, New York. They are both buried in the Burns Cemetery to the south. They had eight children, six of them daughters. There sons, Alfred, and Frank Wilson, are buried in the Wilson Cemetery at the north end of the site.

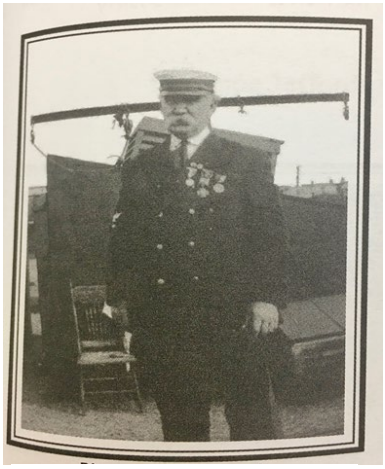

Figure 4 - Chief Master of Arms, Alfred B. Wilson (Baez et al. 2018)

Alfred Burnham Wilson (Fig. 4) was the oldest brother. He was born on February 20th, 1861 and died June 24th, 1942. He served in the Spanish American War in 1898 where he earned the title Chief Master of Arms. He is buried in the south most plot.

Francis (Frank) Mills Wilson, the second brother, was born on August 11th, 1865 and died November 6th, 1940. He was assistance lighthouse keeper for 8 years. He married Henrietta Witzer in 1913, they are pictured together in Fig. 5. Frank is buried in the north most plot in Wilson Cemetery.

Figure 5 - Frank and Henrietta Wilson (Baez et al. 2018)

The two Wilson brothers are the only known graves found in the cemetery. There is rumored to be a third unmarked grave in the cemetery. As Alfred's wife died in New York and Frank's wife lived elsewhere with their daughter at the time of her death the grave can't

be either of theirs. Census records for 1830 show their sister Agnes Wilson living with Frank in the Wilson family home. She stayed there until her death in 1925. We believe the rumored missing grave is Agnes's.

Methodology

Four survey methods were used to investigate the presence of an unmarked grave at Wilson Cemetery. They were each chosen to be as non-invasive as possible. The cadaver dog was the first survey to be completed, followed by soil probing, thermal imaging, and metal detecting. This order was chosen only because we had two cemeteries to survey and one of each tool. The surveys were done over the span of two days. The first was spent finishing the cadaver dog and soil probe surveys and starting the thermal imaging and metal detecting. The second day saw the completion of metal detecting and the recording of metal detector hits. The thermal imaging survey was never completed due to inadequate conditions.

Cadaver Dog

Cadaver dogs are typically used in forensic science to locate bodies in various stages of decomposition, though the further along the bodies are in the process the harder they are to detect (Lasseter et al. 2003). The temperature and wind speed also affect the dog's ability to locate bones properly. The ideal conditions for a cadaver dog survey are temperatures in the 40 – 80-degree Fahrenheit range, with humidity over 20%, and a wind speed of 8km/h (Owsley 1995: 735). The day the survey was done there was a temperature range of 67 – 77 degrees Fahrenheit. If the temperature is to high the dog will have to pant, disrupting its ability to sniff and limiting it to a one-meter range (Lasseter et al. 2003: 2).

The cadaver dog used to survey the Wilson Cemetery was a black lab named Jessie (Fig. 6). Deputy Chad Crawford was his handler. Before we began the survey Crawford first introduced Jessie to the site. Crawford took Jessie to known graves, including the Pre-Colombian graves in the repatriation mound, to see how he would alert on them. When a cadaver dog detects the scent of human decomposition they give off an alert to communicate the location to their handler. There are two kinds of alerts, aggressive and passive. Passive alerts, like jumping or lying down, are preferred because aggressive alerts, like digging, may disrupt the site (Lasseter et al. 2003: 1). Jessie gave a passive alert, jumping and barking. These passive alerts make cadaver dogs a nice, none invasive survey method.

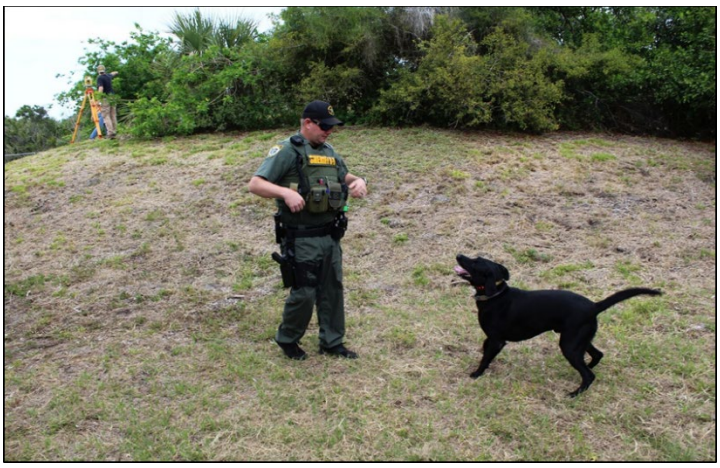

Figure 6 - Cadaver dog Jessie and his handler Chad Crawford

The experiment done by Lasseter and others (2003: 4) used a Labrador dog, like Jessie, for one of there trials. This dog did not properly alert on any of there trials. However, the other breads didn't fair much better, with only two true alerts between the four.

Soil Probe

The soil probe is the simplest, yet the most complicated of the four survey techniques used. Equipped with a T-shaped rod with a slight point at the end, the surveyor works by inserting the rod straight into the ground and feeling the resistance, or lack of. Owsley (1995: 737) recommends probing every 10 inches (25.4 cm). The Wilson survey was done every meter along each transect, with judgmental tests along to way to check false positives.

The simplicity and versatility of the soil probe is what gives it the most usefulness. They come in a variety of sizes and are easily portable. Soil Probing can be done in a wide range of environments, including underwater. They are quick to use, and once the user has enough experience, can be used to get a feel for what's beneath the soil with very little intrusion. Knowing what is beneath the soil before any formal project is important, as shovels can very easily break features that could have been found and navigated around with the soil probe (Owsley 1995).

Owsley (1995) also suggests flagging any discrepancies in the soil as you go along, and this was the plan when beginning to probe. However, in the middle of transect two we realized the "positive or negative" system was not providing enough information. Especially since experience and a good feel for the soil is what makes probing so affective (Owsley 1995). Since this was our first attempt we did not feel we had enough experience to write off any information. The improvised system is a chart, with brief descriptions at each meter. Despite this we did have a few strong positives. Due to the heavy gravel on the Wilson graves they were unable to be probed.

Thermal Imaging

Thermal Imaging is a simple concept. By understanding the basis of heat, and heat transfer, in different ground conditions we can hypothesize a features location, size, contents, and even depth. Under the right conditions you can also detect surface finds using thermal imaging cameras (Casana et al. 2017). The research at the Wilson Grave Site was done using a hand-held camera but the principles of heat it exploits are the same as the drone camera Casana and others work with. They propose that using the thermal imaging equipment at night, just after the sun sets when the ground is giving of the most heat, is a good time to look for

differences in soil. Taking a series of photographs over a period of fluctuating heat is also suggested. Solar radiation generally affects the top 50 cm of soil (Casana et al. 2017).

Due to the Wilson Cemeteries location on the air force base our access was limited and the thermal imaging shots were taken on a less than ideal day.

The image produced demonstrates heat in a scale of color, with blue being the coolest and yellow the hottest. Shadows can also change the image produced, creating a cool spot where there is no present feature. This must be accounted for when analyzing the results.

Archeological use of thermal imaging cameras was demonstrated to be effective by Bob Melia at the Charity Hospital Cemetery (Heitger 2006). This New Orleans cemetery is different from most others in the city as the bodies are located below ground, and mostly unmarked. The use of the thermal imaging camera lead to the discovery of three unmarked graves. Mini excavations, or "ground truthing" (Heitger 2006: 19) confirmed there presence almost a meter down. Melia's methods were not able to be reconstructed, despite their obvious accuracy.

Metal Detecting

Metal detecting has been given somewhat of a bad rap through its association with treasure hunters (Connor 1998). Despite this reputation metal detecting has proven itself useful to archaeological surveys. At the Battle of Little Bighorn site in Montana this method was used to recreate the path of the battle, a feat that would have taken 45,500 shovel test units had they forgone the metal detector (Connor 1998: 78).

Metal detectors work by producing a cone shaped magnetic field aimed into the ground (Connor 1998: 78-79). This field is created by the search coil, a circular wire housed at the bottom of the metal detector. The larger the coil, the larger the cone and the deeper the scan will go (Connor 1998). The survey at Wilson Cemetery used a twelve-inch coil. The cone has two sections, the search area, and the fringe area (Fig. 7). Objects in this fringe area will not clearly be detected so it is important to walk the metal detector in an overlapping zig-zag pattern. This ensures the entire cemetery will be surveyed.

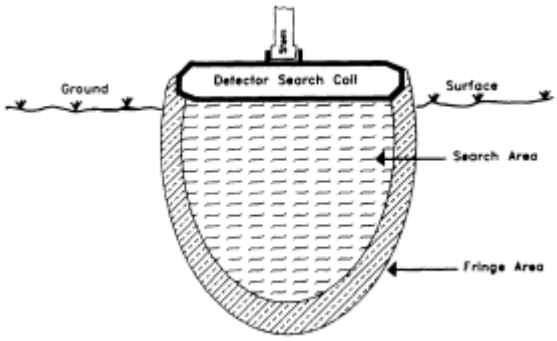

Figure 7 - Electromagnetic fields generated by the metal detector (Connor 1998: 79).

Connor (1998) recommends using fiber glass flags to mark any hits. Using fiber glass instead of the usual metal avoids any false positives where it is simply the flag being detected. The survey at Wilson used alternate color spray paint, orange for soil probe and pink for metal detecting.

Results

Due to the sensitive nature of the techniques and Wilson Cemetarys placement in the Toxic Vapor Corridor we have been unable to properly input all the necessary points for accurate mapping and documentation.

Cadaver Dog

The only survey to properly make it into the ArcGIS mapping software are the cadaver dog alerts. After running about the cemetery and through the vegetation Jessie alerted twice. His first alert, at the memorial, was very promising. The fact that the memorial was specifically placed in that spot could have been because of the grave. The second alert was on Frank's headstone. It is important to note that Jessie did not alert on the known grave stones until the very end of his time in the cemetery. Crawford, his handler, said "Are you getting tired and realizing headstones mean a treat?" It is possible Jessie was not at his best when helping to survey Wilson Cemetery. It was the last area to be surveyed and, as it was nearing on mid-day, Jessie must have been hot and tiered.

Soil Probe

The soil probe results also were not properly mapped. As mentioned before, the original positive and negative system was forgone due to the inexperience of the team. Instead the results were recorded in terms of what the soil felt like in different areas. The results are listed below in figure 8.

T-1
3m - Crunchy/Tree root
6m - Very soft - Fell through

T-3
3m - Roots
4m - Positive - Soft/Loose
5m- Positive - Soft until dense layer
8m -Soft
9m - Soft until denser bottom
10m - Root?
12m - Root?
13m - Positive - soft than dense
- Possible fence cement
15m - Hard, root layer

T-4
2m - Root
4m - Soft
8-11m - Soft soil - Just outside of the wooden grave box
13 - Hard Root
14 - Extremely dense upper layer

T-5
6m - Hard Soil
9m - Soft
11 - Gravel over graves
13m - Soft
16m - Soft

Figure 8 - Soil Probe Results

T-6
1m - Hard
3m - Soft - Right next to STP
7m - Dense
8m - Hard Dense Soil
10m - Hard
11m - Hard Top Soil, loose bottom
13m - Hard along fence line
15m - Hard

T-7
2m - Hard along fence
3m - Soft - Right near ant pile
4m - Hard ***** Very solid and hollow sounding hit
5m - Soft
6m - Soft
7m - Extremely soft
8m - Hard
9m - Hard / Dense
10m - Dense
11m - Dense Pact Soil - Midden?
12m - Soft soil
13m - Hard layer

T-8
3m - Hard Packed
8m - Layer
9m - STP
10-12m - Hard packed

Transect two had nothing notable, and the center of transect nine is, for the most part, in the brush. Soil probe surveys are done walking down the center of the transect, so nine was inaccessible. Some locations, such as T-7 meter 4, had a very notable occurrence and are our true positives. At T-7-4 the probe hit something that was quite solid and very hollow. Probing around the spot within a couple inches the hollow sound continued. A hard probe eventually broke through. T-1-6 was also notable as the probe seemed to fall through the dirt, the surveyor fell over in surprise. However, this probe was the eighth ever done by the survey team so it's strangeness cannot be guaranteed as much as T-7-4.

T-8-8 was also surprising. The probe hit something at a very shallow depth and the surveyors preformed a mini version of Heitger's 'ground truthing' to see if it was close enough to the surface to recover. A hole about 10cm by 10cm was dug with a trowel. The object the probe hit was never found. Several shovel test pits were dug in the cemetery and they all found gravel from the memorial and graves. It is possible some of these hits were buried gravel

Thermal Imaging

The thermal imaging camera, despite worries it would not work well due to weather, produced a wonderful image of both the grave plots and a possible find. The thermal image of the grave plots can be seen bellow in figure nine.

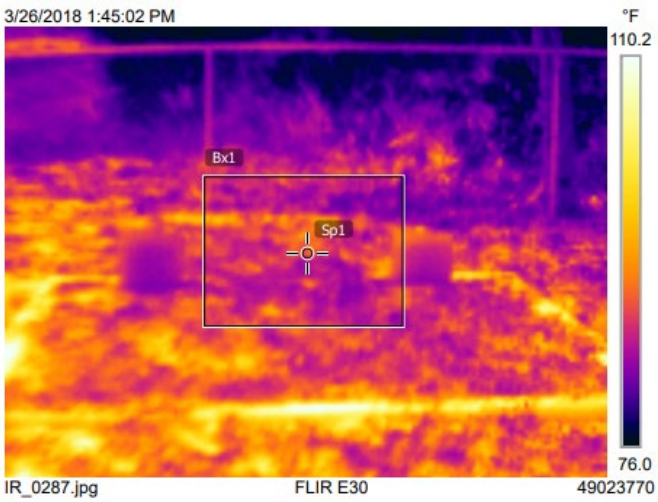

Figure 9 - Wilson Graves Thermal Image

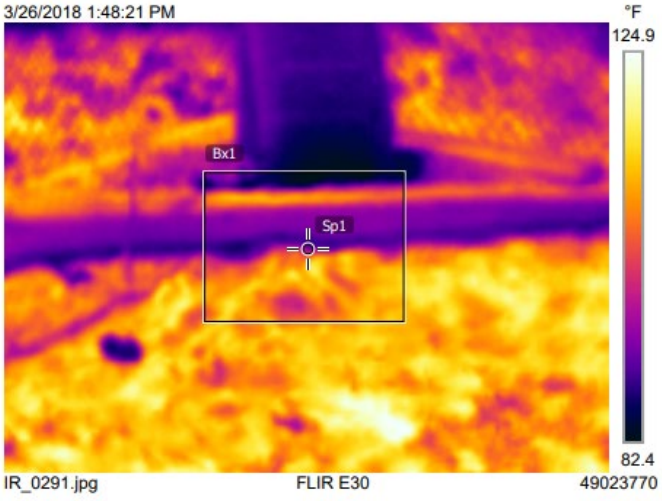

Figure 10 - Wilson Memorial Thermal Image

Figure ten above is a thermal image of the same memorial Jessie alerted at. On the left-hand side of the image you can see a dark line and mass caused by the shadow of the fence, and a bundle of grass. Many of the hopeful finds on the thermal imaging camera turn out to be grass and shadows. There is a cool spot in the center of the image, under the memorial, that does not seem to match up with any grass clump. This is interesting because the pink flag seen in the photo is from the cadaver dog alert.

Metal Detector

The metal detector survey had the most results, with 114 points identified as a hit. The map presented in figure 11 has enlarged points and grid. This was done as a visual aid, since the scale is so small and the area so large.

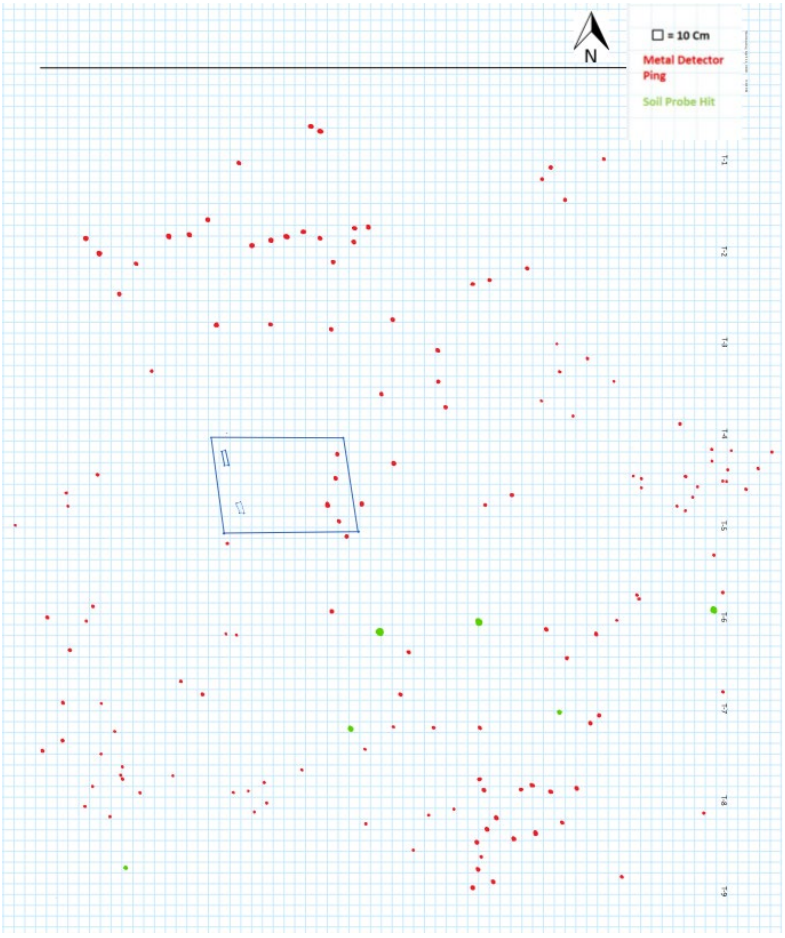

Figure 11 - Metal Detector Hand Drawn Map

The points form a few vaguely rectangular clumps, as well as a few straight lines on the north west side. The west edge of the cemetery was the location of a large amount of surface finds, including glass and white where. The fact that one of the largest clumps, and the most obviously noticeable from within the cemetery, is right on top of it may point to a large deposit of artifacts.

The line of hits to the north and the clump to the south were not immediately noticeable before they were mapped. But there is a clear linear pattern running east to west across the edge, and stopping about half way in.

One issue presented by the metal detector was the metal fence, not depicted on the map. If the metal detector got to close to the fence while it was surveying, it would go off. This effected the accuracy of the survey, and even without the fence on the map you can see where it kind of would be represented by the lack of metal detector points. It also created a small perimeter of straight lines that would have been the limit of where the metal detector can detect the fence.

Conclusions

The data we have collected points to a few possible locations of the unmarked graves. Based on our Probe and Metal detector surveys there seems to be something, or a concentration of something, on the south side of the east fence. A vaguely square shape appeared in the metal detector spots on the ground, this is in T-4 and T-5. It is also interesting to note that on the east side of the fence the soil probe would always hit something hard. This could be part of the fence

construction, or the base of an old fence, as barbed wire was found in a near by shovel test pit. These metal detector hits could also be picking up those parts of the old fence.

Looking at the metal detector map there are a few, almost square like areas that could be graves. The east area discussed above, could be parts of the old fence or other remnants. However, while in the site it was very noticeable to watch take form, with the squared end seeming to open and extend further into the vegetation. The shape almost looks coffin like. However, it is not only facing a different direction than the other two graves, but very far away.

On the south side there is also a significant clump that could be a possible grave, it extends into almost a V pattern. This are also houses a few of the most convincing soil probe hits.

Most of the significant line ups are probably a result of the fence being made of metal though they look wonderfully hopeful. There is a large amount of iron concretions in the area, they have been recovered in this seasons test pits, so the metal detector may be picking up on those as well.

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Appendix

Figure 91 - Top view of graves